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ADEQUATE QUANTISATION IN MULTILEVEL HALFTONING

This application claims the benefit of US Provisional Application No. 60/292,583 filed May 22, 2001.

~~[DESCRIPTION]~~

FIELD OF THE INVENTION

The invention relates to a method for multilevel halftoning of grey-scale and colour images. In a specific embodiment the invention is related to an improved method for multilevel error diffusion.

BACKGROUND OF THE INVENTION

Traditionally the halftoning for images for printing is done using only two levels. The continuous tone density value of a pixel to be reproduced is approximated by printing an appropriate percentage of high density dots within the area representing the pixel. At a particular position either a dot or no dot can be placed.

Today, ink-jet as well as electrophotographic printers exist that render N>2 intensity or density levels. The inkjet printers are able to deliver variable droplet sizes or use multiple inks of the same hue, but different densities, both procedures resulting effectively in reproduction of multiple possible density levels for one printed dot. Halftoning algorithms, such as error diffusion may be extended to the multilevel (i.e. N>2) case. See e.g. US patent 4,680,645 by Dispoto et al describing a method for rendering a grey scale image with variable dot sizes. A continuous tone image is an image containing multiple grey levels with no perceptible quantization to them. In a different multilevel halftoning technique all different continuous tone pixel values within a range (e.g. 0-255) are mapped onto the N allowable values within the range N < 256. These N allowable values correspond to the N density levels which can be rendered by the multilevel system.

The basic error-diffusion algorithm is illustrated in Fig. 1 and works as follows. The first pixel value 21 of the original image 22 is quantized by a quantizer 23 to the nearest allowed value to obtain the output pixel value 24. The quantization error 25, i.e. the difference between the continuous tone input value 21 and the